

III. REMARKS

Status of the Claims

Claims 1-16 are presented for reconsideration.

Summary of the Office Action

Claims 1-16 stand rejected under 35USC103(a) based on the reference Agrawal, U.S. Patent No. 6,072,990, in view of the teaching in the cited reference Lewis, U.S. Patent No. 5,687,290. The Examiner is respectfully requested to reconsider his rejection in view of the above amendments and the following remarks.

Discussion of the Cited Reference

The Examiner relies on the reference Agrawal as primary support for the rejection based on obviousness.

The reference Agrawal describes a system that utilizes a feed back loop to control transmission power in a channel control scheme. This involves an iterative process in which repeated feedback of unsatisfactory performance results in changes to transmission parameters (see column 2, lines 16-31). To reduce system overhead costs, the system of Agrawal controls the frequency of feedback by balancing channel quality against control overhead. To accomplish this, the system of Agrawal monitors word error rate over a window of timeframes to determine an average word error rate. It is only when the average word error rate falls outside the acceptable range that the transmission power is updated (see column 8, lines 3-38). The control parameter in this system is defined as a power code pair, i.e., transmission power and error correction code. In other words, the transmission power and the error correction code are

controlled to determine the correct operating point for current link conditions.

The reference Agrawal fails to disclose the use of fuzzy logic to control modulation mode in a wireless communication link. Further, there is no indication that fuzzy logic can be constructed to use packet error rate as a variable.

In order to fill this gap, the Examiner cites the reference Lewis. The reference Lewis describes a network monitor coupled to a communication network. The network monitor is equipped with a fuzzifier module that generates fuzzy input data processed by a fuzzy inference engine. The fuzzy inference engine applies fuzzy rules to determine a fuzzy output. The teaching of Lewis is summarized in column 3, lines 41-47 as follows:

"In one embodiment of the invention, the apparatus automatically monitors network operational parameters, processes fuzzy input data representative of the operational parameters using fuzzy logic to provide fuzzy output data that is used to control the operation of the network by adjusting network controller parameters."

The reference Lewis is nothing more than a generic description of the use of fuzzy logic. From this the Examiner concludes that it would have been obvious to one skilled in the art to obtain the invention described in the claims of this application. Applicant submits that this is not supported by the cited references.

It seems that the Examiner has combined these two publications because Agrawal discloses word error rate (which the Examiner considers equivalent with the packet error rate) and Lewis discloses the use of fuzzy engine, and because both publications relate to communication technology.

To bridge the rather substantial gap between the cited references the Examiner indicates that motivation exists to use fuzzy logic to render an artificial intelligence based system more flexible. The Examiner's analysis fails to indicate how you get from the simple feedback loop of the system of Agrawal to an artificial intelligence system, such as Rule-Based-Reasoning. Agrawal teaches using a window of time frames in order to avoid excessive feedback iterations. There is no leap to artificial intelligence algorithms, nor any inference that such may be desirable. Further, there is no processing capability to accommodate such a modification. The purpose of Agrawal is to minimize control overhead. This teaches away from moving to artificial intelligence, including fuzzy logic.

Now, considering the word error rate versus packet error rate in more detail. On col. 1, lines 53-54, of Agrawal it is mentioned that *"Data transmission is usually packetized into words so that the error granularity is at the word level."* This may be the reason the Examiner has the opinion that the word error rate of Agrawal is the same as the packet error rate of the present application. It is also mentioned that for a given bit error rate (BER), the observed WER depends on the type of forward error correction scheme used (col. 1, lines 64-65). The term packetization is not quite the same than what is meant when packets are formed from information to be transmitted. One word usually comprises 8 bits which can be protected by error correction data, e.g. CRC (Cyclic-Redundancy-Code). One packet usually comprises different fields, such as header, payload and may also comprise some kind of error correction data field. While it is true that there are similarities between packet error rate and word error rate but they are not equal terms. Further, packet

error rate may not always (if ever) be directionally proportional to the word error rate.

Now considering about the terms "modulation mode" and "power code pair". As can be seen on Table 1 of the present application, there are several modulation modes in Hiperlan/2 standard of the ETSI organization. Those modulation modes define certain properties to be used when data to be transmitted is modulated: data speed, modulation method, coding ratio, codes per low carrier wave, codes per OFDM symbol, and data bits per OFDM symbol. The system selects among those modulation modes one for transmission. The modulation mode may change during transmission especially when channel conditions are varying. In the present invention, *"...a set of fuzzy logic rules is formulated in such a manner that the packet error rate and the change rate of the packet error rate are used as values influencing the control. Thus, the modulation mode and the transmission power control are selected in accordance with the rules of fuzzy logic."* Therefore, it is determined (on the basis of the packet error rate and the change rate of the packet error rate) which modulation mode fulfils the requirements at a given time and that modulation mode is selected for use. In Agrawal, several power-code pairs are defined, i.e., for each power level (transmission power of a transmitter) a certain code is selected. This means that when the transmission power is changed to a new level, the code corresponding to that level will be used in the transmission. It can be seen that there is some analogy between the power-code pair and the modulation mode, although the combination of parameters is different.

When modulation mode is selected, data speed, modulation method, coding ratio, etc. may change. When power-code pair is selected, only the transmission power and/or error correction code is

changed. In other words, quite different parameters are affected in the system of the present invention than in the system of Agrawal.

The Issue of Obviousness

It is well settled that in order to establish a prima facie case for obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, without reference to the disclosure of this application.

Applicant submits that the above described deficiencies of the primary reference Agrawal are not remedied by the proposed combination with the teaching of the reference Lewis. The combined references do not therefore support a prima-facie case of obviousness. The modification of the teachings of Agrawal or Lewis, in order to obtain the invention, as described in the claims submitted herein, would not have been obvious to one skilled in the art.

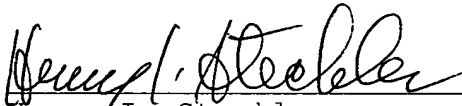
There is nothing in the reference Lewis which suggests that packet error rate may be used as a control variable in a fuzzy logic control engine. Likewise the reference Agrawal is silent with respect to the desirability of using fuzzy logic. Applicant submits that the combination of the teachings of the cited references would be contrary to the stated purpose of Agrawal.

The above arguments apply equally to the rejected dependent claims.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

A check in the amount of \$450.00 is enclosed for a two month extension of time and additional claim fees. The Commissioner is hereby authorized to charge payment for any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,


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